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'Under extreme environmental pressure, characteristics were acquired': epigenetics, race and Salman Rushdie's *The Satanic Verses*

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Josie Gill

'Under extreme environmental pressure, characteristics were acquired': epigenetics, race and Salman Rushdie's *The Satanic Verses*

This article examines the role that literature might play in post-genomic biology as it moves toward a complex, non-deterministic conception of the gene. Epigenetics has overturned the notion of 'the gene' as discrete entity with stable, determining effects. Instead, epigenetics reveals that genes can change according to environmental circumstances and that such changes can be passed on to offspring. This finding has far-reaching implications for the concept of race. The effects of past environments – the experience, for example, of slave ancestors – become embodied in health disparities in the present, the genes carry a 'memory' of these experiences, while creating new memories as they are affected by contemporary experiences of racial inequality. This essay argues that literature can illuminate our understanding of these emerging scientific insights. I explore how Rushdie's representation of the porous boundary between the body and its wider environment in *The Satanic Verses* offers a mode of comprehending the epigenetic effects of racism as the imagined (racist belief in the inferiority of other races) made real (in apparently 'racial' biological characteristics), and how Rushdie's interrogation of the relationship between the imaginary and reality reveals how fiction might be brought to bear on the science of epigenetics.

Keywords

Race; racism; epigenetics; post-genomic biology; Salman Rushdie

Writing in 2005, five years after the mapping of the human genome, geneticist Johnjoe McFadden noted that the idea that there are 'genes for' certain diseases and conditions was already beginning to crumble. Systems biology, he argued, has revealed that 'rather than having a single major function, most genes . . . probably play a small part in lots of tasks within the cell'.¹ Genes can no longer be considered 'discrete nuggets of genetic information' but are 'diffuse entities whose functional reality may be spread across hundreds of interacting DNA segments'.² The complexity of the system, in contrast to the reductionism of the gene-centric biology that dominated the latter half of the twentieth century, is comparable, in McFadden's view, to the 'holistic approaches' which have 'always dominated the humanities and social sciences'.³ He ends his article with the following example:

The first eight chapters of Salman Rushdie's *Midnight's Children* describes the lives of the narrator's grandparents, parents, aunts, uncles and friends against the backdrop of the tumultuous politics of 20th-century India and Pakistan. The reason, according to the narrator, is that 'to understand just one life, you have to swallow the world'. Perhaps biologists ought to have read more.⁴

McFadden's suggestion, that literature has already imagined the kinds of complexity that biology is only now beginning to uncover, and that biologists might learn from literary ways of knowing the world, is a provocative one. While literary scholars have increasingly argued that literature can shed light on the workings of genetics, on 'the gene as a conceptual object disseminated by intellectual activity'⁵ or on 'the nature of the relationship between science and representation',⁶ few, undoubtedly wary of the historically fraught relations between the disciplines, have suggested that literature might offer models and approaches which science might look toward. Although McFadden's call for biologists to read more is perhaps made somewhat flippantly, in inviting the literary into the realm of the biological, positioning it as a discipline of comparable epistemological weight with the capacity (even when not addressing science directly) to influence how genetics is conceptualised and understood, McFadden's article raises wider questions about the role that literature might play in post-genomic biology as it moves toward a complex, non-deterministic conception of the gene. If contemporary genetic discoveries have been in some way previously conceived of in literature, then how can literature guide understanding of these emerging scientific insights?

This essay will offer some tentative answers to this far-reaching question through an examination of an emergent strand of post-genomic biology – epigenetics. Like the systems biology to which McFadden refers, epigenetics – broadly defined as the study of changes in gene function and expression that do not comprise changes in the DNA sequence – has overturned the notion of ‘the gene’ as discrete entity with stable, determining effects. Instead, epigenetics is revealing that genes are plastic, that they can change according to environmental circumstances, and that such changes can be passed on to offspring, thus reconfiguring genetic inheritance and development as fluid and complex, rather than fixed, processes. Of particular interest in this essay will be the implications of epigenetic processes for the concept of race. I suggest that epigenetics, in demonstrating how the effects of past environments can be manifested in health disparities in the present through the inheritance of epigenetic marks, reasserts the significance of the history of racism, as well as the contemporary lived experience of racial inequality. These are factors which are frequently dismissed in contemporary accounts of race in science, which have instead tended to posit race as being ambivalently ‘in-between’ the biological and the cultural. Epigenetic science, I argue, reveals the pitfalls of such constructions and offers a more productive mode of conceiving of the relationship between race, biology and culture.

The essay then turns to consider the potential role of literature in thinking through the implications of an epigenetic understanding of race. The way experiences of racism become biologically embodied has already been imagined in contemporary fiction: Salman Rushdie’s 1988 novel *The Satanic Verses*, invokes Lamarckian evolutionary theory (epigenetics’ historical predecessor) as it imagines the acquisition of characteristics through migration and the subsequent exposure to the racist environment of England.⁷ Using *The Satanic Verses* as a case study, I explore how Rushdie’s representation of the porous boundary between the body and its wider environment not only offers a mode of comprehending the epigenetic effects of racism as the imagined or fictional (racist belief in the inferiority of other races) made real (in apparently ‘racial’ biological characteristics), but in interrogating the dynamic relationship between the imaginary and reality, *The Satanic Verses* reveals how fiction itself might be brought to bear on the science of epigenetics.

It is a commonplace that the concept of race has been substantially reconfigured by post-genomic biology. The mapping of the human genome famously affirmed what Richard Lewontin had proposed in 1972; that the differences between humans within traditionally conceived racial groups are greater than the differences between so-called races; that race, as biological concept, has no meaning. Yet research on genetic variation between racial groups has continued since the completion of the

Human Genome Project; population genetics, race-based medicine and genetic ancestry tracing technologies all draw upon racial distinctions as a means of examining genetic variations between populations. While some scientists have noted the limitations of using race given its 'unscientific' conceptual status,⁸ and critics have argued that the continuing use of the concept of race risks a return to racial science,⁹ an opposing and highly influential view of these developments has emerged which postulates that race in science does not pose a threat because 'the linkages of race, biology, and medicine have taken very different shapes at different times' and 'they take very different forms as they are entwined with distinct styles of thought about health, illness, and the body at different times and places'.¹⁰ This is the view advanced by Nikolas Rose, who argues that race has been reconceived in advanced liberal democracies in the twenty-first century as a new biopolitics of identity emerges. The current relationship between race and genetics, he argues,

is intrinsically linked to the delineation and administration of biosocial communities, formed around beliefs in a shared disease heritage, demanding resources for the biomedical research that might reveal the genomic bases of these diseases, and mobilized by the hope of a cure.¹¹

For Rose, race has been integrated into the wider revolution in the politics of identity that the new genomics has precipitated, where

the molecular rewriting of personhood in the age of genomics is linked to the development of novel 'life strategies' for individuals and their families, involving choice, enterprise, self-actualization, and prudence in relation to one's genetic makeup. And these genetic practices of individuation provide new ways in which individuals are locating themselves within communities of obligation and self-identification delineated by race.¹²

The question of whether race is in fact genetic (it clearly is not, as many scientists and theorists – most recently John Dupre¹³ – have shown) is less important to Rose than emphasising that it is the 'active biological citizens'¹⁴ of the twenty-first century who give new meanings to race as they campaign for and consume various racialised genetic technologies, molecular biomedicine becoming 'a new register of multiple hopes, and the site of creation of new individual and collective identities and aspirations'.¹⁵ David Skinner also argues in this vein, claiming that both the use of 'ethnic' drugs and the desire to trace ancestry point to 'the active involvement of lay members of minorities in the developing of public discourse on

science, race, ethnicity'.¹⁶ As such, for Skinner, 'it will no longer be possible to dismiss discussion of biological differences between people as racist'.¹⁷ In sum, race is neither wholly biological essence nor cultural construct, but is the locus of increasingly complex intersections between biology and culture:

race now signifies an unstable space of ambivalence between the molecular level of the genome and the cell, and the molar level of classifications in terms of population group, country of origin, cultural diversity and self-perception. It is in this new space of ambivalence that a new genomic and molecular biopolitics of race, health and life is taking shape.¹⁸

It is undeniable that the actions of the gene and its wider environment and culture have become increasingly difficult to separate, as Evelyn Fox Keller argues in *The Mirage of a Space Between Nature and Nurture*.¹⁹ Yet as the title of her book makes plain, this means that we must abandon the nature–nurture, nature–culture dichotomies and any sense of there being a 'space' between the two – which is precisely what Rose argues for in locating race ambivalently in a space 'between' the biological and the cultural. The spatial metaphor which underpins Rose's claim that race in science is made entirely new by the intervention of racial minorities, leading to a non-deterministic race-based biosociality, is based on an outdated conception of 'the gene' and reveals the assumptions behind, and ultimately pitfalls of, this thinking. His description of race as occupying an 'unstable space of ambivalence between' recalls the conceptual framework of hybridity, as it has been theorised and developed (from its historical origins in biology) in postcolonial studies. Homi Bhabha theorised hybridity as being the product of colonialism, where discourses of colonial power are disrupted and made ambivalent by the encounter with the cultural difference of the colonised.²⁰ For Bhabha, 'Hybridity represents that ambivalent "turn" of the discriminated subject into the terrifying, exorbitant object of paranoid classification – a disturbing questioning of the images and presences of authority.'²¹ He later developed hybridity to refer to the fusion of cultures that results from 'third world migration': 'the hybrid strategy' is 'a space of negotiation' which is 'neither assimilation nor collaboration' but in which hybrid agencies 'deploy the partial culture from which they emerge to construct visions of community ... that give narrative form to the minority positions they occupy; the outside of the inside: the part in the whole'.²² The concept of hybridity thus came to signify the unsettling of notions of essentialism and as such has been highly influential, travelling beyond postcolonial studies where, as Pnina Werbner has noted, 'in the postmodern imaginary, hybridity invades

whole areas of sociological discourse, subverting and conflating long-established classes and categories'.²³ It would appear that this is the function of hybridity in Rose's description of race as occupying 'an unstable space of ambivalence': the hybrid framework conveys the breakdown and subversion of the boundaries between biology and culture which Rose emphasises, providing the in-between, non-essential space in which to position the new meaning of race.

However, the effect of this conceptual borrowing is that Rose's theorisation of race in post-genomic biology reiterates, rather than challenges, the tired focus on the politics of identity, at the expense of an engagement with history, which has characterised postcolonial formations of hybridity. Critics of theorisations of cultural hybridity have often pointed to the privileging of questions of identity in favour of an engagement with the social and political struggles of the postcolonial subjects whose experience 'hybridity' is supposed to describe.²⁴ The preoccupation with ambivalent or in-between identities often only relates to the experiences of postcolonial theorists and writers themselves – those with an 'elevated perspective'²⁵ or 'the intellectual elite'.²⁶ Similarly, the theorisations of Rose and Skinner take little account of the fact that race is still experienced by the majority of racialised peoples as a form of disadvantage, rather than a radical opportunity for expressing freedom and choice, or a way of 'narrating and experiencing identity'.²⁷ Rose bases his conclusions on examples such as the collection of genetic data from African Americans by Howard University (a private, Black university in the USA) or the consumption of racial ancestry tracing technologies by African Americans (presumably the affluent ones), yet for the majority of black Americans, the experience of race in medicine and science is not a chance 'to construe their selves and identities partly in biomedical terms'.²⁸ Racialised forms of medicine, far from providing targeted treatment, leave 'room for much potential harm'²⁹ as the social and economic causes which can account for racial differences in health are lost in the push to discover and define specifically genetic differences.³⁰ The recent history of racism in biomedical science suggests that caution is required,³¹ yet both Rose and Skinner repeatedly maintain that race in science today is far removed from, and has little or no connection to racial science, decrying those who suggest possible connections as being engaged in an outdated 'sociocritique'.³²

The result of this failure to take full account of the history of race in science/racial science is that Rose's evocation of race as a hybrid of the biological and the cultural ironically recalls the very history of race in science which he so consciously seeks to avoid. The celebration of identity in postcolonial formations of hybridity has often occurred at the expense of a consideration of the history of the term: the concept of hybridity was employed by nineteenth-century racial scientists to describe racial mixing

and became central to debates about whether different races were different species, the test for different species being whether the progeny would be infertile, a charge often levelled at mixed race populations in the colonies.³³ The lack of attention paid to this racialised history has resulted, as several scholars have shown, in the repetition of ideas and structures from past racialised discourses in contemporary theorisations of hybridity.³⁴ For Robert J.C. Young

The question is whether the old, essentializing categories of cultural identity, or of race, were really so essentialized, or have been retrospectively constructed as more fixed than they were. When we look at the texts of racial theory, we find that they are in fact contradictory, disruptive and already deconstructed ... in deconstructing such essentialist notions of race today we may rather be repeating the past than distancing ourselves from it or providing a critique of it.³⁵

Rose claims that whereas race in the nineteenth-century was understood at the molar level – in terms of visible, physical characteristics – the ‘molecular gaze of contemporary genomics transforms this perception’, creating a complexity which is simply not deterministic in the way that racial science was.³⁶ While the mechanics of measuring race might have changed, Rose’s claim does not take account of the fact that race (in science) has never been wholly deterministic, essentialised or biologised. For example, Sarah Winter, noting the arguments of sociologists such as Rose, has shown how Darwin called into question ‘the dominant tradition of typological classification that ranked animals and humans qualitatively on the basis of their differences in physical appearance’ and instead revealed ‘the incoherence of race as a deterministic category with a fixed biological meaning’ in *The Expression of the Emotions in Man and Animals*, a theory which Winter argues might offer methodological insights for post-genomic biology.³⁷ In a similar manner to the repetition of the ‘already deconstructed’ discourses of racial theory in postcolonial theorisations of hybridity, Rose’s characterisation of race as occupying an ‘unstable space of ambivalence’, hovering uncertainly between biology and culture, reiterates the ambivalence of race in nineteenth-century science, an ambivalence built into the concept of hybridity from its inception in racial science. Far from providing a new, radical framework for conceiving of race and its relationship to the biosciences, the hybrid model of an ambivalent in-between race risks having the same impact as older discourses on race where ‘the ambiguities, contradictions and discrepancies manifest within particular racial theories and racialised medicine are more likely to strengthen than weaken racial discourses’.³⁸

How, then, can we conceive of the relationship between race and biology in a way which recognises the complex interaction of biology and culture but resists the artificial separation of the two?; a way which recognises that there are no 'genes for' race, but accounts for the history of racism as well as contemporary experiences of racial inequality? Recent developments in the burgeoning science of epigenetics may provide the answer. Epigenetics, in its broadest sense, is concerned with the interaction of genes and environment. It is the study of the process by which the chemicals and proteins within DNA are modified, through methylation and histone modification, affecting gene expression, but not the fixed sequence of DNA. The discovery which has forced scientists to reconsider their long held assumptions is that epigenetic marks can be switched on or off according to the environmental conditions in which the body finds itself, and that such changes can be inherited by offspring and passed from generation to generation.³⁹ For Tim Spector, Professor of Twin Research and Genetic Epidemiology, epigenetics challenges four fundamental assumptions that have governed genetic science: that genes singlehandedly define the essence of human beings and are the only mechanism of inheritance; that genes and heritable genetic destiny cannot be changed or modified; that an environmental event cannot produce a long lasting influence on your genes; and that you cannot inherit the effects of your ancestors' environments.⁴⁰ The more familiar linear model of development and inheritance in which genes are fixed for life and passed on unchanged has thus been fundamentally challenged by the newly revealed complexity of gene and environment interaction. The study of epigenetic mechanisms reveals that the human body's genetic structures can change and change back, that the body is in a dynamic relationship with its environment, that culture can become embodied.

The initial findings of epigenetic studies have far-reaching implications for race in science. Rather than consolidating racial categorisations, or fixing race as a deterministic essence, epigenetics reveals how race as experience influences genetic development and inheritance. A study by Grazyna Jasienska has suggested that the lower birth weight of African-American babies in comparison with the birth weight of European Americans is attributable not only to contemporary socio-economic inequalities, but to the conditions experienced during slavery, the effects of which have been passed through generations via epigenetic processes.⁴¹ Jasienska argues that while difference in socio-economic status does account for some racial differences in birth characteristics, it does not account for the significant differences in the weight of newborns between black and white women on low incomes or, within black populations, between the babies of black women born in African countries living in the USA and black women born in the USA.⁴² Jasienska suggests that the difference

can be explained by the 'influence of intergenerational life conditions, especially for the female line' which for African Americans comprises the 'inadequate diet and strenuous workload' of slave populations who 'experienced an imbalance between energy intake and energy expenditure, and had high energetic costs of fighting infectious diseases'.⁴³ The low birth weight of African-American children is thus partly the result of the low weight of slave children, the low rate of childhood growth as a result of poor nutrition and intense labor from a young age experienced by slaves, and the fact that slave mothers and grandmothers had poor nutritional development during adult life.⁴⁴ The experiences of ancestors become embodied in health disparities in the present, the genes carrying a 'memory' of these experiences, while the genes also create new memories as they are affected by the psychosocial stresses of racism in the present.

Indeed, other studies have focused on the environmental influences on the genes which occur during the lifetime of an individual as the cause of racial differences in health outcomes. Kuzawa and Sweet, studying the US black-white disparity in cardiovascular disease, suggest that

there is now a strong rationale to consider developmental and epigenetic mechanisms as links between early life environmental factors like maternal stress during pregnancy and adult race-based health disparities in diseases like hypertension, diabetes, stroke and coronary heart disease.⁴⁵

Racial differences in rates of cardiovascular disease are explained by the fact that lower birth weights in African Americans are related to higher blood pressure in later life, and that lower birth weights are caused by maternal stressors and the passage of stress hormones across the placenta, which are, in turn, caused by psychosocial stress, depression, exposure to racial discrimination and residential segregation.⁴⁶ What these studies of epigenetic processes show is that race becomes a fluid, complex combination of the influence on the genes of an individual's current environment and the environment of their ancestors. Racism has biological effects which in turn create racial disparities in health; rather than biologising social definitions of race, race is revealed as a social construct with biological consequences.

Epigenetics might thus provide a radical opportunity for the re-thinking of race, enabling a much needed reassertion of the importance of both historical and contemporary forms of racial discrimination, factors often excluded from identity-focused theorisations of the indeterminism of race in the biosciences such as that put forward by Rose. Epigenetic mechanisms reveal not only the fictiveness of the nature–culture binary, but the impossibility of there being an ambivalent space between the two; they do

not show that culture has a more significant influence on inheritance and development than the gene, but that such distinctions no longer have any meaning. Fox Keller, for whom emerging descriptions of epigenetics are in fact in danger of reiterating the meaningless question ‘how much of our behavior is driven by our genes versus the environments in which we grow up and live’, contends that it is a case of understanding that ‘the gene’ cannot be a discrete entity because it has no meaning in the absence of its opposite;

What is the causal role of a gene in the absence of environment? None is clearly the answer. Absent environmental factors, genes have no more power to shape the development of an individual than do environmental factors in the absence of genes.⁴⁷

Instead, she argues, it is the ‘cellular complex’ around the gene which ‘not only reads, translates, and interprets that sequence, but also defines it’ and makes any sense of a gene/environment binary obsolete:

not only is it a mistake to think of development in terms of separable causes, but it is also a mistake to think of the development of traits as a product of causal elements interacting with one another. Indeed, the notion of interaction presupposes the existence of entities that are at least ideally separable – i.e., it presupposes an a priori space between component entities – and this is precisely what the character of developmental dynamics precludes. Everything we know about the processes of inheritance and development teaches us that the entanglement of developmental processes is not only immensely intricate, but it is there from the start.⁴⁸

The epistemological contribution of epigenetics to debates about genetic inheritance and development is precisely this illumination of the ‘entanglement’ of processes, which makes clear that the nature–culture, nature–nurture, biology–culture models which have persisted into the twenty-first century have lost meaning. Although Keller contends that ‘we scarcely need the new science of genomics and epigenetics to teach us this lesson’,⁴⁹ in the face of the continuing conceptual separation of the environmental and the biological when it comes to race, epigenetics offers a salient reassessment of the assumptions which continue to govern dominant scientific and sociological thinking about the meaning of race.

The novel findings of epigenetics have begun to emerge into the public domain and, as has been the case with previous genetic breakthroughs such as the Human Genome Project, literary analogies and allusions have been employed to communicate this science. In the introduction

to her popular science book *The Epigenetics Revolution* Nessa Carey compares DNA to a script, asking her readers to think of the way cells read genetic code as different film versions of *Romeo and Juliet*, stating that 'the same script can result in different productions'.⁵⁰ Tim Spector references Rudyard Kipling's *Just So Stories* – fantastic tales of how various animals came to obtain their physical characteristics through human or environmental intervention – in the leopard print design of his book's dust jacket. The use of such literary references can have a profound effect on the way genetic science comes to be understood by the public,⁵¹ however, I want to suggest that literary precursors to epigenetic ideas might play a wider and more complex role in how that science is comprehended. Rather than simply providing convenient analogies which ease the passage of scientific communication, literature can offer ways of thinking through the emerging issues from epigenetic science. In what follows I explore Salman Rushdie's *The Satanic Verses* as an example of how fiction might enhance understanding of the impact of historical and contemporary racisms on the body, something that epigenetic science is only now beginning to uncover.

Rushdie has become increasingly interested in biological science and its relationship to fiction. In 2009, the twentieth anniversary of the fatwa against his life, Rushdie became a member of the advisory board of Project Reason, a not-for-profit organisation set up with the purpose of 'spreading scientific knowledge and secular values in society'.⁵² The project, whose board members include writers Ian McEwan and Ayann Hirsir Ali, as well as several prominent contemporary biologists and geneticists including Richard Dawkins, Steven Pinker and Craig Venter, brings together thinkers from the literary and scientific worlds who share the belief that rational thinking, science and secularism need to be asserted in the face of the irrationality and fundamentalism of religious belief. Rushdie's involvement is perhaps not surprising given his increasing participation in public debates about Islam following the terrorist attacks of 9/11 and 7 July 2005, debates which have often sought to construct Islamic belief as a pre-modern dogma irreconcilable with the West which, in contrast, is heralded as the embodiment of rational, progressive thought.⁵³ Yet what Project Reason adds to the debate, and makes explicit, is the specifically scientific character of the reason it promotes; the project places biological science and evolutionary theory at the centre of its response to religious belief, as the ultimate answer to it. Rushdie has increasingly adopted the logic of evolutionary biology as means of explaining – and defending – storytelling, as a way of foreclosing objections to literary expression, such as those put forward by some Muslims following the publication of *The Satanic Verses*. In recent interviews, Rushdie claims that the 'story instinct is hardwired in our DNA'⁵⁴ and that 'any external

limitations on our ability to speak, or on the content of our speech, therefore, interferes with something essential to us all, whether we are writers or not'.⁵⁵ Stressing the innateness and universality of storytelling through a Darwinian framework in which we are all 'story-telling animals',⁵⁶ Rushdie appears to align himself with the evolutionary explanations of literature to be found in sociobiology and the Literary Darwinist movement.

In this context it might seem unlikely that Rushdie's writing could engage with the fluidity and non-deterministic findings of epigenetics – the opposite of the deterministic world-view which characterises neo-Darwinian approaches to biology and literature. Yet as several critics have noted, Rushdie's non-fictional writing and journalism are consistently more polemical than his fiction, the ideological clarity of the former at odds with the more ambivalent, contradictory character of the latter.⁵⁷ Moreover there has been a 'profound ideological shift'⁵⁸ in Rushdie's thinking, which began with the fatwa against him in 1989, but was cemented by the events of 9/11.⁵⁹ Indeed, Rushdie's engagement with evolutionary biology prior to this 'shift', in *The Satanic Verses* itself, is of a more complex kind than the Darwinian view he would later come to adopt. *The Satanic Verses* is a tale of the experiences of immigrants in Britain under Thatcher and follows the lives of two Indian immigrants, Saladin Chamcha and Gibreel Farishta, as they struggle to make their way in London following their abrupt arrival in England: the novel opens with Saladin and Gibreel falling to earth from their exploded jumbo jet which has been hijacked by terrorists. On the plane, Saladin encounters American creationist Eugene Dumsday who explains to Chamcha that he has been

warning your fellow men . . . against Mr Darwin and his works. With the assistance of my personal fifty-seven slide presentation. I spoke of my own country, of its young people . . . I see them in their despair, turning to narcotics . . . If I believed that my great-granddaddy was a chimpanzee, why, I'd be pretty depressed myself.⁶⁰

As his name suggests, Dumsday is dumb, and his blinkered religious fundamentalism can only be laughed at – Chamcha's response is to 'giggle' (p. 77) – and Dumsday's sermonising is comically undermined when later in the novel Chamcha hears him on the radio and he now embodies the things which he abhors; the devil (having 'lost the half of his tongue' (p. 418) in the hijacking incident) and modern biological science, which has enabled his tongue to be rebuilt 'with flesh taken from his posterior' (p. 418).

Rushdie's scepticism toward the kinds of religious fundamentalism which deny Darwinian evolution is clear, yet the novel resists taking its

own fundamentalist stance toward biology and instead draws upon a pre-Darwinian theory of evolution as a metaphor for one of its foremost themes – the condition of migrancy. As Saladin and Gibreel fall through the sky they encounter ‘the debris of the soul, broken memories, sloughed-off selves, severed mother-tongues, violated privacies, untranslatable jokes, extinguished futures, lost loves, the forgotten meaning of hollow, booming words, *land, belonging, home*’ (p. 4). These are the changes wrought on the individual by migration, Rushdie suggests, and to emphasise their force, such changes are depicted as being manifested in a physical change in the body of the migrant. Saladin and Gibreel metamorphose as they fall, the ‘processes of their transmutation’ (p. 5) playfully explained by the narrator through reference to the early nineteenth-century botanist Jean-Baptiste Lamarck:

Mutation?

Yessir, but not random. Up there in air-space, in that soft, imperceptible field which had been made possible by the century and which, thereafter, made the century possible, becoming one of its defining locations, the place of movement and of war, the planet- shrinker and power-vacuum, most insecure and transitory of zones, illusory, discontinuous, metamorphic, – because when you throw everything up in the air anything becomes possible – wayupthere, at any rate, changes took place in delirious actors that would have gladdened the heart of old Mr Lamarck: under extreme environmental pressure, characteristics were acquired. (p. 5)

Lamarck’s thesis, set out in his 1809 *Philosophie Zoologique*, was that it was possible for organisms to acquire physical characteristics during their lifetimes, which were then inherited by their offspring.⁶¹ It was a controversial theory which was invoked throughout the nineteenth century but which enjoyed a significant resurgence during the debates that followed Darwin’s *Origin of Species* in 1859.⁶² The idea that environmentally acquired characteristics might be passed on genetically was, after dominating debates for several decades, ultimately laid to rest with the Modern Evolutionary Synthesis in the 1940s when Darwinian natural selection became the basis of modern genetic science. However the transgenerational responses identified by recent epigenetic studies have led some to conclude that Lamarck was, in fact, partially right.⁶³

Rushdie comically invokes Lamarckian evolution as the magical science which explains the immigrants’ equally magical transmutation by migration; yet as the novel progresses it becomes apparent that it is the socially and culturally hostile environment of England which dictates

the nature of the characteristics which the immigrants go on to acquire. Picked up by the police and immigration officers, who abuse him in the back of their van, dragging off his clothes, beating him, and making him eat his own excrement, Saladin becomes the 'animal' (p. 159) they call him, growing horns, hairy thighs and hoofs, 'squealing like a pig' (p. 161) before being beaten unconscious. Saladin's literal dehumanisation is a direct result of the racism to which he is subject, and he is taken to the medical facility at the detention centre where he is surrounded by other immigrants who, the manticore in the bed next to him explains, have undergone similar transformations;

'There's a woman over that way,' it said, 'who is now mostly water-buffalo. There are businessmen from Nigeria who have grown sturdy tails. There is a group of holidaymakers from Senegal who were doing no more than changing planes when they were turned into slippery snakes' (p. 168).

The experience of racism manifests itself in physical, bodily changes which the immigrants themselves can hardly believe are true: in the face of the impossible, Saladin is forced to constantly remind himself that 'he was a member of the real world' (p. 74), that 'I am a real man' (p. 135), and is particularly confounded by the fact that the police officers who abuse him are not alarmed by his mutation;

What puzzled Chamcha was that a circumstance which struck him as utterly bewildering and unprecedented – that is, his metamorphosis into this supernatural imp – was being treated by the others as if it were the most banal and familiar matter they could imagine. (p. 158)

Yet the police officers are not surprised by Saladin's appearance because for them it is not unreal or impossible; they see immigrants as animals and as less than human, and that becomes their reality. The enduring effect of racism is to make the imaginary real, as Saladin finally discovers in hospital, "“They describe us,” the other whispered solemnly. “That’s all. They have the power of description, and we succumb to the pictures they construct.”” (p. 168).

Rushdie's insistence that it is racism which creates the racial other, whose difference is constructed and made rather than biologically fixed or inherited, has clear parallels with the conclusions of epigenetic studies which recognise seemingly racial characteristics as the biological embodiment of cultural and environmental circumstances. Rushdie's representation of these processes, however, is of course 'unrealistic': changes to genetic structures are not the same as physical human-animal

metamorphosis. The question is thus what value such a magical-realist fictional representation can have for how we think about epigenetics; can such fantastical depictions of humanity shed any light on a scientific (epigenetic) understanding of life? A similar question is posed by Ian McEwan in his 2005 novel *Saturday*, in which the novel's neuroscientist protagonist, Henry Perowne, questions the efficacy of the magical-realist style of contemporary writers, including Rushdie:

What were these authors of reputation doing—grown men and women of the twentieth century—granting supernatural powers to their characters? He never made it all the way through a single one of those irksome confections. And written for adults, not children. In more than one, heroes and heroines were born with or sprouted wings . . . Others were granted a magical sense of smell, or tumbled unharmed out of high-flying aircraft.⁶⁴

Perowne objects to fictions such as *The Satanic Verses* because they are not grounded in a 'recognizable physical reality', their magical or supernatural forms evidence, in Perowne's view, of an 'insufficient imagination' because 'the actual, not the magical, should be the challenge' (p. 67). However what *The Satanic Verses* works to show is precisely that the actual and the magical are not as easily as separable as Perowne imagines them to be. The value of Rushdie's magical representation of race and Lamarckian evolution lies in its very ability to reveal the dynamic relationship between the imaginary and the real; the immigrants' unprecedented animalistic transformations work to show the arbitrariness, absurdity, but also the ultimate power of the racist belief which shapes their reality. In the context of epigenetics, the novel's magical realism enables us to think of the relationship between environment and physiological responses as the imaginary (slave owners' belief in the racial inferiority of their slaves) made real (in health disparities in the present). Rushdie's depiction of race thus highlights what is latent in emerging epigenetic studies, namely, that race is no more than a powerful fiction made real by racism.

Writing on the relationship between science and literature in McEwan's *Saturday*, David Amigoni argues that the novel poses the question, in the face of Perowne's evident scientific expertise and skills, 'what does literature do, how does it speak within a culture saturated by genetic science?'⁶⁵ and begins to answer it in Perowne's diagnosis of the criminal Baxter, where Perowne exploits 'not the metaphysical, but indeed *the magical* thinking that hovers below the metaphysical justification of the patient-doctor relationship'.⁶⁶ It is the ability of literature to reveal and make space for such magical thinking as one of the 'varied meanings' of 'the gene' which, for Amigoni, shows 'what literature can do'.⁶⁷ Although Rushdie, unlike McEwan, does

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not address the ‘culture of genetics’ directly in *The Satanic Verses*, the novel similarly reveals what fiction ‘can do’ in an epigenetic culture: Rushdie’s fantastical imaginings demonstrate that the imagined must be acknowledged, accounted for, and ultimately accepted as part of ‘the real’ in a science which itself was not long ago considered ‘magical’. Put differently, Rushdie’s novel demonstrates that the imagined – fiction – is capable not only of exploring but of informing a scientific reality which is constantly changing and incorporating what was previously unreal. As epigenetic studies continue to uncover the biological effects of the experience of racism, fictions such as *The Satanic Verses* offer a salient reminder of the ‘power of description’, be it in the racist thought of slave owners or indeed in fictional works, in shaping the environments in which we live.

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Notes

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- 7 That the literary example upon which McFadden draws is taken from Rushdie also is serendipitous.
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